# Kansas Air Quality Report 2005-2006

Bureau of Air & Radiation
Kansas Department of Health & Environment

A Message from the Director of the Division of Environment

#### Dear Reader:

The Kansas Department of Health and Environment is pleased to provide you with the 2005-2006 Air Quality Report. This annual report is one of many efforts our department makes to keep the citizens of Kansas informed about air quality issues that affect each of us every day. Throughout this report you will find information on the history of air quality policy and regulations, air pollutant definitions, air quality monitoring results, causes and effects of air pollution, and air pollution prevention tips. The purpose of the Air Quality Report is to inform the public and local stakeholders of monitoring results and emissions trends for the previous calendar year. These trends help us all to understand the current conditions of our air quality, successful pollution reduction strategies, and can help to identify areas where improvement is needed.

Ronald F. Hammerschmidt, Ph.D.Director, Division of Environment

Kathleen Sebelius, Governor

Roderick L. Bremby, Secretary

# Table of Contents

# 2005-2006 Air Quality Report

## 1. Message from the Director

### 4. Air Quality Overview

Includes information on the history of air quality policy and regulations, National Ambient Air Quality Standards, and Criteria Pollutant descriptions.

# 10. Air Quality Monitoring

Information on the air quality monitoring network and monitoring site locations, what the networks monitor for, and 2005 monitoring results with specific information on Kansas City and Wichita Ozone.

## 17. Kansas City & Wichita Ozone

Updates on work being done in Kansas City and Wichita

#### 21. Causes & Effects of Air Pollution

This section provides information on sources of air pollution, the emissions inventory, health effects of poor air quality, and tips for improving air quality.

### 26. Program Update

Details on new and upcoming changes or projects including the Clean Air Mercury Rule, Lawn and Garden Outreach Program, and Regional Haze.

#### 29. About the Bureau

Includes information on the Bureau of Air and Radiation's mission and a summary of each section's responsibilities

# Air Quality Overview

#### What is the Clean Air Act?

The Clean Air Act (CAA) is a federal act originally written in 1970 and is the driving force for all air pollution legislation in the United States. It was written with the primary goal to protect human health and it impacts each of us every day. The CAA serves as a base for a coordinated federal and state regulation system, with the Environmental Protection Agency (EPA) responsible for the Act but with states doing much of the implementation. Under the CAA, all 50 states are responsible for completing and implementing a State Implementation Plan, or SIP. SIPs provide the guidance for a state to achieve standards in the CAA, or if standards are met, how to prevent the air from becoming significantly deteriorated. In 1990, the Clean Air Act was re-written with new terms, amendments and standards intended to ultimately result in improved air quality nationwide.

#### What are the National Ambient Air Quality Standards?

The National Ambient Air Quality Standards (NAAQS) that were established in the original CAA are periodically revised by EPA. Pollutants in this category, termed **criteria pollutants**, include: particulate matter, lead, sulfur dioxide, carbon monoxide, ozone, and nitrogen dioxide. The current NAAQS are summarized by pollutant in the table on page 5. As shown in the table, there are two types of air quality standards. The primary standard is designed to protect the public health with an adequate safety margin. Permissible levels of each pollutant were chosen to protect the health of the most susceptible individuals in a population, including children, the elderly, and those with chronic respiratory illnesses. The secondary standard is designed to protect public welfare and ensure quality of life. Air quality conditions described by the secondary standard may be the same as the primary standard and are chosen to limit economic damage, as well as harmful effects to buildings, plants, and animals.

During 2004, the Kansas Ambient Air Monitoring Program measured five of the six criteria air pollutants. Monitoring for lead was phased out during 1998, due in large part to the significant drop in measured values caused by the elimination of lead compounds as an additive in gasoline. The following sections will describe each of the five monitored criteria pollutants, their health effects, and their sources.

# National Ambient Air Quality Standards

Criteria Pollutant	Averaging Times	Primary Standards	Secondary Standards
Carbon Monoxide	8-hour <sup>(1)</sup>	9 ppm (10 mg/m³)	None
111011011100	1-hour <sup>(1)</sup>	35 ppm (40 mg/m <sup>3</sup> )	None
Lead	Quarterly Average	$1.5 \mu g/m^3$	Same as primary
Nitrogen Dioxide	Annual (Arithmetic Mean)	0.053 ppm (100 μg/m³)	Same as primary
Particulate Matter (PM <sub>10</sub> )	Annual <sup>(2)</sup> (Arith. Mean)	Revoked <sup>(2)</sup>	Revoked <sup>(2)</sup>
	24-hour <sup>(1)</sup>	150 μg/m <sup>3</sup>	Same as primary
Particulate Matter (PM <sub>2.5</sub> )	Annual <sup>(3)</sup> (Arith. Mean)	15.0 μg/m <sup>3</sup>	Same as primary
	24-hour <sup>(4)</sup>	$35 \mu g/m^3$	Same as primary
Ozone	8-hour <sup>(5)</sup>	0.08 ppm	Same as primary
	1-hour <sup>(6)</sup> (Applies only in limited areas)	0.12 ppm	Same as Primary
Sulfur Oxides	Annual (Arith. Mean)	0.03 ppm	None
	24-hour <sup>(1)</sup>	0.14 ppm	None
	3-hour <sup>(1)</sup>		0.5 ppm (1300 μg/m³)

- (1) Not to be exceeded more than once per year.
- $^{(2)}$  Due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution, the agency revoked the annual PM<sub>10</sub> standard in 2006.
- $^{(3)}$  To attain this standard, the 3-year average of the weighted annual mean PM<sub>2.5</sub> concentrations from single or multiple community-oriented monitors must not exceed 15.0  $\mu$ g/m<sup>3</sup>.
- $^{(4)}$  To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35  $\mu g/m^3$ .
- (5) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.
- (a) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is ≤ 1, as determined by appendix H.
  (b) As of June 15, 2005 EPA revoked the 1-hour ozone standard in all areas except the fourteen 8-hour ozone non-attainment Early Action Compact (EAC) Areas.

#### Criteria Pollutants: Definitions and Health Effects

#### Sulfur Dioxide (SO,)

#### What is Sulfur Dioxide and where does it come from?

Sulfur dioxide  $(SO_2)$  is a colorless gas that has a pungent odor at concentrations exceeding 0.5 ppm. Sulfur dioxide belongs to the family of sulfur oxide gases. Sulfur is prevalent in raw materials such as crude oil, coal, and metal ores. Sulfur oxide gases are formed when fuel containing sulfur is burned, when gasoline is extracted from oil, and when metals are extracted

from ore. The majority of SO<sub>2</sub> released into the atmosphere comes from electric utilities, particularly those that burn coal. Other sources that burn high sulfur fuel and release SO<sub>2</sub> include petroleum refineries, cement manufacturing, metal processing facilities, locomotives, large ships, and some off-road diesel equipment. Sulfur dioxide dissolves in water vapor to form sulfuric acid, and interacts with other gases and particles in the air to form sulfates and other products that can be harmful to people and their environment.

# What are the health effects of sulfur dioxide? Sulfur dioxide contributes to respiratory illness,

particularly in children and the elderly, and aggravates existing heart and lung diseases. SO<sub>2</sub> particularly affects people with asthma. It also contributes to the formation of acid rain, which damages trees, crops, historic buildings, and monuments, and

makes soils, lakes, and streams acidic. Sulfur dioxide and sulfate particles can be transported over long distances and deposited far from the point of origin. This means that problems with  $SO_2$  are not confined to areas where it is emitted. It also contributes to the formation of atmospheric particles that cause visibility impairment.

#### Carbon Monoxide (CO)

#### What is Carbon Monoxide and where does it come from?

Carbon monoxide (CO) is a colorless, odorless gas that is formed when carbon in fuel is not burned completely. It is a component of motor vehicle exhaust, which contributes about 56 percent of all CO emissions nationwide. Higher levels of CO generally occur in areas with heavy traffic congestion. Other sources of CO emissions include industrial processes (such as metals processing and chemical manufacturing), residential wood burning, and natural sources such as forest fires. The highest levels

of CO typically occur during the colder months of the year when inversions are more frequent. Inversions occur when the pollution becomes trapped near the ground beneath a layer of warm air.



#### What are the health effects of carbon monoxide?

Carbon monoxide can cause harmful health effects by reducing oxygen delivery to the body's organs and tissues. The health threat from lower levels of CO is most serious for those who suffer from heart disease such as angina, clogged arteries, or congestive heart failure. For such a person, a single exposure to CO at low levels may cause chest pain and reduce that person's ability to exercise; repeated exposures may contribute to other cardiovascular effects. Higher levels of CO can affect even healthy people. People who breathe high levels of CO can develop vision problems, suffer reduced manual dexterity, and experience difficulty performing complex tasks. CO also contributes to the formation of smog, which can trigger serious respiratory problems.

#### Nitrogen Oxides (NO<sub>x</sub>)

#### What are Nitrogen Oxides and where do they come from?

Nitrogen oxides ( $NO_x$ ), is the generic term for a group of highly reactive gases, all of which contain nitrogen and oxygen in varying amounts. Many of the nitrogen oxides are colorless and odorless. However, one common pollutant, nitrogen dioxide ( $NO_2$ ), along with particles in the air can often be seen as a yellowish-brown layer over many urban areas. Nitrogen oxides form when fuel is burned at high temperatures, as in a combustion process. The primary sources of  $NO_x$  are motor vehicles, boilers, furnaces, and other industrial, commercial, and residential sources that burn fuels.

 $NO_x$  is one of the main pollutants involved in the formation of ground-level ozone, which can trigger serious respiratory problems. Most  $NO_x$  is emitted to the atmosphere as nitric oxide (NO), which in the presence of hydrocarbons is then converted to nitrogen dioxide (NO<sub>2</sub>). The  $NO_2$  created by this reaction is then available to participate in the reaction that forms ozone. Nitrogen oxides also react to form nitrate particles and acid aerosols, which cause respiratory problems.  $NO_x$  and the pollutants formed from  $NO_x$  can be transported over long distances, following the

pattern of prevailing winds in the U.S. This means that problems associated with  $NO_x$  are not confined to areas where it is emitted.  $NO_x$  is most effectively controlled by a regional perspective or plan, rather than focusing on sources in one local area.

#### What are the health effects of nitrogen oxides?

NO<sub>x</sub> and sulfur dioxide react with other substances in the air to form acids, which fall to earth as rain, fog, snow or dry particles. Acid rain causes deterioration of car finishes, buildings and historical monuments, and causes lakes and streams to become acidic and unsuitable for many species of fish. NO<sub>x</sub> reactions can also cause the formation of small particles that penetrate deeply into sensitive parts of the lungs and can cause or worsen respiratory disease such as emphysema and bronchitis, and aggravate existing heart disease. Nitrate particles and nitrogen dioxide can block the transmission of light, reducing visibility in urban areas, and on a regional scale, in our national parks and wilderness areas.

#### Ozone (O<sub>3</sub>)

#### What is Ozone and how is it formed?

Ozone  $(O_3)$  is a gaseous compound composed of three oxygen atoms. It is created by a chemical reaction between nitrogen dioxide and volatile organic compounds (VOCs) in the presence of certain meteorological conditions including heat, solar radiation, and little or no wind . Ozone has the same chemical structure whether it occurs miles above the earth or at ground level. "Good" ozone, generally known as the Ozone Layer, occurs naturally in the stratosphere approximately 10

to 30 miles above the earth's surface. This layer protects life on earth from the sun's harmful ultraviolet rays. In the earth's lower atmosphere, ground-level ozone causes health and environmental problems and is considered "bad."

Motor vehicle exhaust, industrial emissions, gasoline vapors, and chemical solvents are some of the major sources of NO<sub>x</sub> and VOC emissions that help to form ozone. Peak ozone levels typically occur during hot, stagnant summertime conditions. Large urban areas tend to have the highest ozone levels due to the increased number of sources. Rural areas can experience increased ozone levels when wind carries ozone and pollutants that form it hundreds of miles from their original sources.

#### What are the health effects of ozone?

Even at low levels, ground-level ozone triggers a variety of health problems including asthma attacks, reduced lung capacity, and increased susceptibility to respiratory illnesses like pneumonia and bronchitis. Ozone can irritate lung airways and cause inflammation, and after long-term exposure, can cause permanent lung damage. Other symptoms include wheezing, coughing, pain when taking a deep breathe, and breathing difficulties during exercise or outdoor activities. People with respiratory problems are most vulnerable to elevated ozone levels. Gr

problems are most vulnerable to elevated ozone levels. Ground-level ozone also damages the leaves of trees and other plants, ruining the appearance of cities, national parks, and recreation areas. Ozone reduces crop and forest yields and increases plant vulnerability to disease, pests, and harsh weather.

#### Particulate Matter (PM)

#### What is Particulate Matter and where does it come from?

Particulate matter (PM) is a broad classification of non-gaseous pollutants that consists of very fine solid particles and liquid droplets, or aerosols. Examples of these solid particles can include dust, dirt, soot, and particles in smoke. Some particles are directly emitted into the air from sources such as vehicles, factories, construction sites, tilled fields, unpaved roads, stone crushing, and burning of wood. Other particles may be formed in the air when gases from burning fuels react with sunlight and water vapor such as fuel combustion in motor vehicles, or at power plants. Particles can be suspended in the air for long periods of time and vary in size. Some particles are large or dark enough to be seen as soot or smoke. Others are so small that they can

only be detected with an electron microscope.

# What are the health effects of Particulate Matter?

Particulate matter causes a wide variety of health and environmental impacts. Examples of serious health effects include, aggravated asthma coughing, breathing difficulty, chronic bronchitis, decreased lung function, and premature death. Elevated PM concentrations result in increased hospital admissions

and emergency room visits for people with heart and lung disease. Health problems for sensitive people can get worse if they are exposed to high levels of PM for several days in a row.

#### $PM_{10}$

Particulate matter with an aerodynamic diameter of less than or equal to 10 microns is designated as  $PM_{10}$ . Burning of wood, diesel and other fuels, and open burning emit particulate matter to the atmosphere, generally in the form of smoke. In addition, dust from agricultural operations, unpaved roads, and dust storms contain significant proportions of  $PM_{10}$ . Some areas within the state of Kansas experience occasional severe episodes of blowing dust or dust storms. Inhalation of  $PM_{10}$  can cause irritation of the nose and throat, bronchitis, and damage to lung tissue. Children, elderly persons, and individuals with impaired lung or heart function are especially susceptible to the adverse health effects associated with inhalation of airborne particulate matter.

#### **PM**<sub>2.5</sub>

In 1997, EPA added a new particulate matter standard for particles with an aerodynamic diameter of less than or equal to 2.5 microns (PM<sub>2.5</sub>). This change was based on concerns that smaller particles travel deep into the lungs and cause or aggravate respiratory problems such as asthma and chronic bronchitis. Children, the elderly, and people with lung or heart disease are considered to be especially susceptible to the adverse health effects of airborne fine particulate matter.

Fine particles (PM<sub>2.5</sub>) result from fuel combustion in motor vehicles, power generation, and industrial facilities, as well as from residential fireplaces and wood stoves. Research has shown that gases such as sulfur oxide and SO<sub>2</sub>, NO<sub>x</sub>, and VOCs interact with other compounds in the air to form fine particles.





# Air Quality Monitoring

What does the Kansas Air Monitoring Network do?

The Kansas air monitoring network collects air quality data in order to:

- Evaluate whether Kansas citizens are exposed to air pollutants in concentrations above the federal ambient air quality standards.
- Determine regional and national air pollution trends.
- · Determine federal air quality standard attainment or non-attainment status.
- · Educate and inform the public through reports such as this, presentations, and the agency website.
- Determine whether air quality models are working properly by comparing modeled results against monitored results.

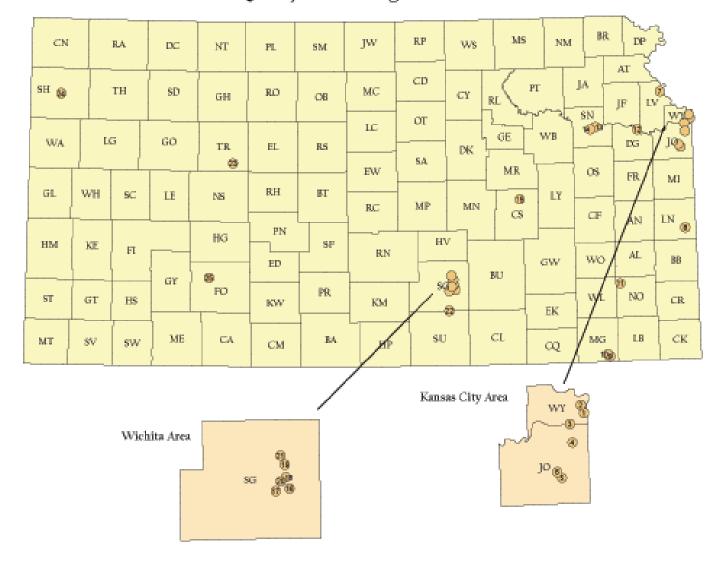
Air monitoring data is posted to the Bureau of Air and Radiation (BAR) Web site to inform the public about air quality on a near real-time basis, www.dhe.state.ks.us/aq. This allows people to make decisions to reduce exposure to air pollution by staying indoors or reducing physical activity. They can also make life style choices such as riding the bus or avoiding unnecessary trips to reduce emissions of air pollutants.

Data generated by the Kansas monitoring network is reported on a quarterly basis to the Air Quality System (AQS), a national database maintained by EPA.

#### Who operates the monitors?

The Kansas air monitoring network provides air quality data from 25 sites around the state (See Map 1 and Table 1). Members of this network include BAR, Wyandotte, Shawnee, and Sedgwick county environmental departments, and the Kansas Department Wildlife and Parks and private citizens, participate in monitoring activities. Private citizens also collect samples at particulate matter monitors in several locations. Finally, BAR staff provides quality assurance audits at all monitors in the network.

#### Air Quality Monitoring Sites in Kansas



Site #	City/County	Address
1	KC	420 Kansas
2	KC	JFK Community Ctr.
3	KC	Midland Trail Elem.
4	Overland Park	Jo. Co. Justice Ctr.
5	Johnson Co.	Heritage Park
6	Olathe	14701 Brougham
7	Leavenworth	U.S. Penitentiary
8	Linn Co.	Mine Creek Historical Site
9	Coffeyville	Union & East North
10	Coffeyville	1801 North Buckeye
11	Chanute	1500 West Seventh
12	Lawrence	Lawrence Airport
13	Topeka	Robinson Middle School
14	Topeka	2529 SW Chelsea Dr.
15	Chase Co.	Tallgrass Prairie
16	Wichita	G. Washington & Skinner
17	Wichita	Pawnee & Glenn
18	Wichita	1900 East Ninth, H.D.
19	Wichita	3600 N. Hydraulic
20	Wichita	Douglas & Main
21	Park City	200 East 53rd North
22	Peck	Peck Community Bldg.
23	Trego Co.	Cedar Bluff Reservoir
24	Goodland	1010 Center
25	Dodge City	2100 First

Map 1 Table 1

#### What does the network monitor?

For 2005, the Kansas Ambient Air Monitoring Network consisted of 25 sampling sites at which the following criteria pollutants were measured:

- Fine particulate matter  $(PM_{25})$  at 16 sites
- $PM_{10}$  at 14 sites
- Ozone (O<sub>3</sub>) at 9 sites
- Meteorological data at 7 sites
- Sulfur dioxide (SO<sub>2</sub>) at 6 sites
- Carbon monoxide (CO) at 4 sites
- Nitrogen dioxide (NO<sub>2</sub>) at 4 sites
- Fine particle speciation at 2 sites
- Hydrogen sulfide (H<sub>2</sub>S) at 1 site
- Total Suspended Particulate at 1 site
- IMPROVE-protocol at 2 sites

The type and location of the monitors that comprise the network are a result of our effort to serve the many uses for the data described previously. A monitor may be located to evaluate air quality near a specific facility or other potential



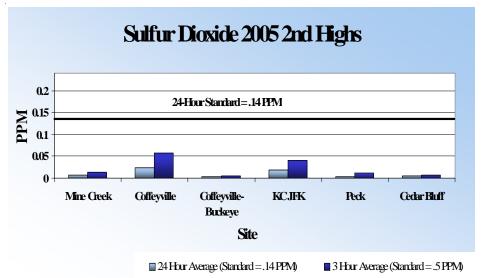
source of air pollution, or it may serve a broader purpose. The majority of monitors are located in metropolitan areas to collect data representative of exposure of large populations to air pollutants. The ozone and PM<sub>2.5</sub> monitors are examples of such monitoring locations. Our network also includes two monitoring locations designed to evaluate the impacts of long range transport of air pollutants into and through Kansas. The monitoring sites at Peck and Mine Creek serve this purpose. They also provide valuable background data for Wichita and Kansas City respectively. The monitoring site at Cedar Bluff is located in an area relatively free of air pollutants caused by industry or transportation sources and therefore serves as a baseline or background site for the entire state.

# Air Quality Monitoring Results

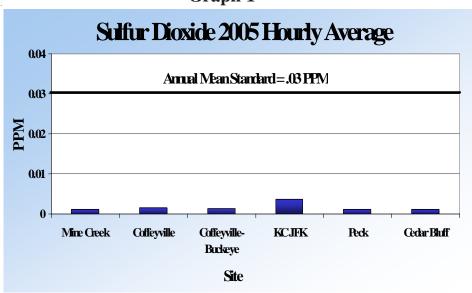
#### Monitoring Results: Sulfur Dioxide (SO<sub>2</sub>)

The primary air quality standard for SO<sub>2</sub> is expressed in three forms: an hourly average value, 3-hour value not to be exceeded more than once per year, and a 24-hour value not to be exceeded more than once per year. Graph 1 shows the hourly average concentrations for six sites where SO<sub>2</sub> was monitored in Kansas during 2005; Mine Creek (Linn County), Coffeyville (Montgomery County), Coffeyville-Buckeye (Montgomery County), KC JFK (Wyandotte County), Peck (Sumner County) and Cedar Bluff (Trego County). The annual mean monitoring results for all six sites were well below the hourly standards for SO<sub>2</sub>. The Kansas City JFK site showed the highest concentration for the hourly average standard due to the proximity of the site to industrial sources of SO<sub>2</sub>.

Graph 2



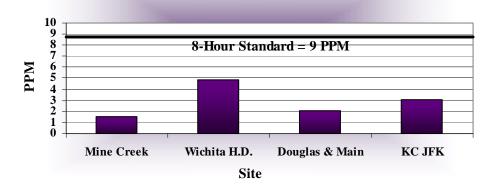
Graph 1



Graph 2 displays 2005 monitoring results showing the 2nd highest average for both the 24-hour standard and the 3-hour standard. Monitoring results from the Coffeyville site showed the highest concentration for both standards. The 2nd highest average for the 3-hour standard was about .06 parts per million (ppm) and the 2nd highest average for the 24-hour average standard was about .02 ppm.

Graph 3

# Carbon Monoxide 2005 2nd High 8-Hour Average



#### **Monitoring Results: Nitrogen Oxides (NOx)**

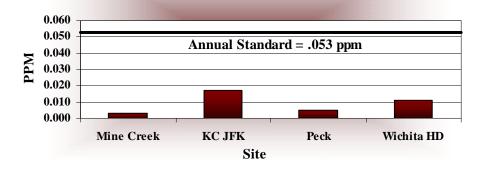
The primary air quality standard for NO<sub>2</sub> is expressed in the form of an annual arithmetic mean. Graph number 4 shows the NO<sub>2</sub> monitoring results for the four sites. These sites include Mine Creek (Linn County), Kansas City JFK (Wyandotte County), Peck (Sumner County) and Wichita H.D. (Sedgwick County). All sites were well below the primary air quality standard of 0.053 ppm. The annual average concentration recorded at the Kansas City JFK site was the highest due to its location in a metropolitan area, where commercial, industrial, and motor vehicle emissions are more prevalent.

#### **Monitoring Results: Carbon Monoxide (CO)**

The primary air quality standard for CO is expressed in two forms: an 8-hour average value and a 1-hour average value. Both are not to be exceeded more than once per year. Graph 3 shows the 2nd highest 8-hour average concentrations for the four sites where CO was monitored in Kansas during 2005. The four CO monitoring sites are Mine Creek (Linn County), Wichita Health Department (Sedgwick County), Douglas and Main (Sedgwick County), and Kansas City JFK (Wyandotte County). All of the sites were well below the 8-hour standard.

Graph 4

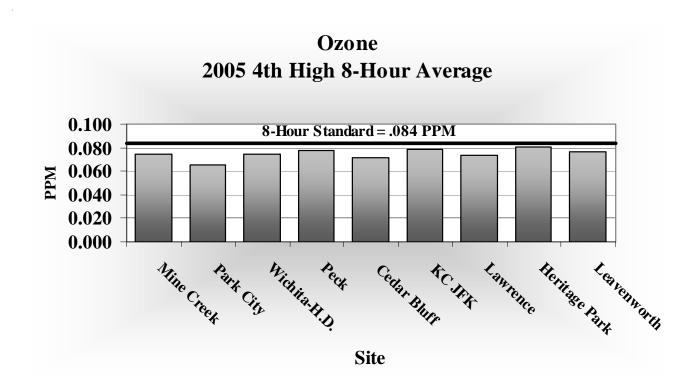
### Nitrogen Dioxide 2005 Hourly Average



#### Monitoring Results: Ozone (O<sub>2</sub>)

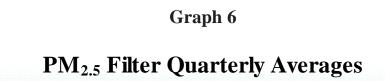
The primary air quality standard for ozone is averaged over an 8-hour time period. The standard is expressed in the form of the three-year average of each year's 4th highest concentration. The 8-hour standard is 0.08 ppm. The standard allows for upward rounding of the results. The standard is not exceeded until monitored values exceed 0.084 ppm. When evaluating ozone monitoring results, it is important to remember two points. First, the rounding allowed by the standard means that a value can be slightly above the standard and not be considered a violation. Second, ozone values higher than the standard for one year do not always indicate a violation of the air quality standard. These determinations are made on the basis of three years of data. Graph number 5 shows the 4th highest 8-hour average concentrations for nine sites. The 8-hour results show that some of the monitors are fairly close to the standard.

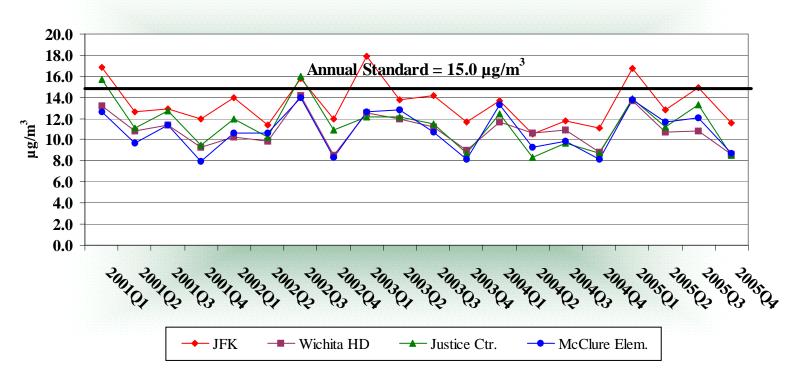
Graph 5



#### Monitoring Results: Fine Particulate Matter (PM, 5)

The PM<sub>2.5</sub> standards issued by EPA in 1997 were set for two time periods, an annual average and a 24-hour average. The annual average standard was set at 15.0 micrograms per cubic meter (ug/m³), while the 24-hour average standard was set at 65 ug/m³. In September of 2006, EPA revised the standards for particulate matter. The new standards retained the annual average standard of 15.0 ug/m³, and lowered the 24-hour standard to 35 ug/m³. Graph 6 lists the quarterly values of PM<sub>2.5</sub> that were recorded across the state from 2001 to 2005. The monitoring sites are JFK (Wyandotte County), Wichita HD (Sedgwick County), Justice Center (Johnson County) and McClure Elementary (Shawnee County).





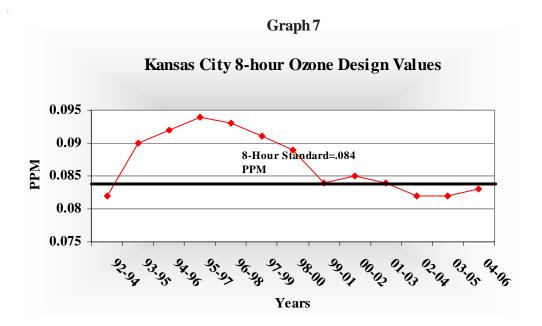
# Kansas City and Wichita Ozone

# **Kansas City Ozone**

Ground-level ozone pollution has long been a concern to the Kansas City Metropolitan area. In 1978, the US Environmental Protection Agency (EPA) designated Kansas City as a nonattainment area after monitoring data from Kansas and Missouri showed that ozone levels were violating the one-hour standard. Both states were required to develop State Implementation

Plans (SIP) to improve air quality and bring the city back into compliance. Throughout the 1980's and 1990's, Kansas City continued to violate the one-hour standard and the states were required to revise their SIPs and implement additional control measures for volatile organic compound (VOC) emissions

In 1997, the EPA developed a more stringent 8-hour ozone standard. A very unusual combination of factors caused the Kansas City area to record violations of the new 8-hour standard during April 2003, demonstrating the impact that transport of pollutants can have on the area. In April, the annual burning of rangeland in the Flint Hills was compressed into fewer days than normal due to drought conditions. As a result, significantly more acres were burned in a few days than in normal



years. This coupled with unusual weather conditions for that time of year, caused emissions of VOCs and  $NO_x$  from the fires to impact Kansas City and other points east of the Flint Hills. Ozone readings in excess of the standard occurred at monitors in Kansas City in the middle of April. Readings of that magnitude so early in the ozone season were unprecedented.

As a result of the unusual circumstances surrounding these high readings, the Missouri Department of Natural Resources requested that EPA flag the April 2003 data so that it would not be considered in determining whether the Kansas City area violated the new 8-hour ozone standard. EPA did not flag the data, but did designate the Kansas City area as unclassifiable, effectively postponing a final decision on whether the area violated the new standard.

As a result of unseasonably cool temperatures during the summer of 2004, a violation was avoided and the EPA designated the Kansas City area attainment in May of 2005. In 2007, the low readings from 2004 will drop from the three year average and the standard will likely be violated. (See Graph 7)

Over the years, many actions have been taken to reduce the emissions of VOCs and NO<sub>x</sub> in the Kansas City area. Many area businesses and industries have installed reasonably achievable control technology (RACT) to lower VOC emissions. In addition, both Kansas and Missouri implemented a "low-RVP rule," which limits the volatility of motor vehicle fuel in the Kansas City area during the summer months. The Mid-America Regional Council's Kansas City Clean Air Action Plan (CAAP) brought together local government officials, industry representatives, state officials, and public interest groups to develop a variety of voluntary strategies to reduce emissions. Each of these actions have helped reduce emissions in the Kansas City area, but more reductions are needed to keep the city from being designated a nonattainment area for ozone.

The two states are currently preparing the revised Kansas City Ozone Maintenance Plans. These plans will contain contingency measures that could be enacted in the event that the region violates the standard in 2007 or in future years. These measures are being worked out with input from the regulated industries. The contingency measures focus primarily on NO<sub>x</sub> reductions. Further VOC reductions will be much more expensive to achieve.

There are many pollution control strategies contained in the Clean Air Action Plan that remain to be implemented. Many of these need an industry or government "champion" to take a leadership role in implementing them. We encourage everyone with a stake in clean air in Kansas City to review the control strategies in the Plan and pick one that resonates personally or with your business interests, and get involved. For more information on the Plan and how you can get involved, contact MARC at (816) 474-4240 or the Bureau of Air and Radiation at (785) 296-1593.



Clear day in Kansas City, MO taken from Kansas City, KS

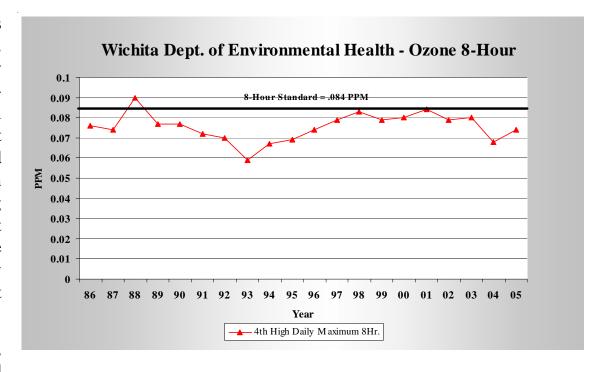


Smoggy day Kansas City, MO taken from Kansas City, KS

Wichita Ozone Graph 8

The Wichita Department of Environmental Health has monitored air pollution levels since the early 1970's. During the 1990's, the city's ozone levels began to steadily rise, raising concerns that the city would violate the health-based standards established by the Environmental Protection Agency (EPA). Graph 8 shows the ambient ozone monitoring trends for the monitoring site located at the Wichita Department of Environmental Health between the years of 1986-2005. Additional monitoring sites are located south of Wichita at Peck and north at Park City. Graph 8 shows that while there were moderate increases in ozone levels throughout the 1990's, the city has stayed below the 8-hour ozone standard for the past four years.

When EPA issued the 8-hour standard in July of 1997, local officials in Wichita-Sedgwick County recognized



the need to take a proactive stance and agreed to participate in an EPA program known as the Voluntary Ozone Reduction Consortium. The goal of the program is for cities with ozone values close to the 8-hour standard to develop voluntary ozone reduction strategies.

In 1999, local officials formed a work group of individuals representing industry, government, education and the public to address the ozone problem. The public education efforts currently underway inform citizens about the health effects of exposure to ozone, the role that individuals' daily activities play in ozone formation and actions they can take, such as car pooling, to reduce emissions of ozone precursors. During the 2005 and 2006 ozone seasons, the Wichita Department of Environmental Health conducted voluntary tailpipe emissions and gas cap tests. The events are a part of a continuing Air Quality Awareness Program designed to educate citizens on how they can help keep Wichita's air clean.

# Causes and Effects of Air Pollution

#### **Causes of Air Pollution in Kansas**

# Where does air pollution come from in Kansas?

Sources of air pollution are divided up into four categories; Point Sources, Area Sources, On-road Mobile Sources and Non-road Mobile Sources. **Point sources** are large, stationary sources of emissions. Examples of point sources are natural gas compressor stations, petroleum refineries and grain processing or storage facilities. **Area sources** are smaller, generally more numerous sources whose individual emissions do not qualify them as point sources. Although area sources release relatively small amounts of air pollutants on an

individual basis, because of the numbers of these sources, their emissions as a whole are significant. Examples include household solvents and paints, motor vehicle refueling and residential fuel combustion. **On-road Mobile sources** are sources of air pollution that are not stationary, and can typically be driven on a highway such as cars, trucks, buses and motorcycles. **Non-road Mobile Sources** are also not stationary, but typically are not driven on highways. Example of Non-road Mobile Sources include lawnmowers, locomotives and tractors.





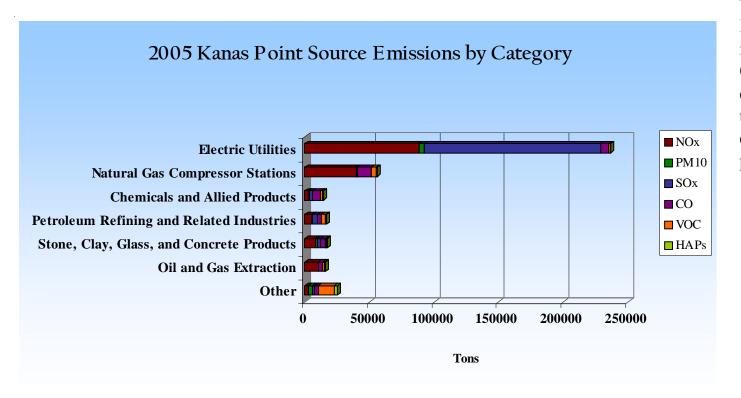
#### **Emission Inventory**

An emissions inventory is a summary of air pollutant emissions covering a geographic area for a specific time period. Emissions inventories have multiple uses on both the federal and state levels. The Bureau of Air and Radiation uses emissions inventory information in the following ways:

- To determine trends in air pollutant emissions levels
- To provide inputs to air quality modeling
- To design air pollution control policies
- To site ambient air monitors
- To determine emission fees

#### **Point Source Emissions Inventory**

Every year the Bureau of Air and Radiation prepares an emissions inventory of SO<sub>2</sub>, CO, NO<sub>x</sub>, VOC, PM<sub>10</sub> and hazardous air pollutants (HAPS) from point sources in Kansas. The Bureau mails survey forms to facilities with Class I and Class II permits requesting information regarding operating rates and the quantities and types of air pollutants emitted during the preceding calendar year. After the facilities complete the forms and submit them to the Bureau, the information is reviewed for quality assurance purposes, entered into a large database and forwarded to the Environmental Protection Agency (EPA).



The Bureau has completed the Kansas point source emission inventory for calendar year 2004. Graph 9 utilized point sources emissions data only. It shows which types of point sources in Kansas are emitting the highest amounts of pollutants.

Graph 9

#### Effects of Air Pollution

#### What are the health effects of poor air quality?

There are many adverse health effects from air pollution and poor air quality. Both symptoms and the severity of the effect can vary greatly from person to person. Some health effects of poor air quality include difficulty breathing, chest pains, coughing, and headaches. People with asthma, bronchitis, emphysema or other upper respiratory illness are often more susceptible to adverse health effects caused by poor air quality. Determining the quality of the air on a daily basis is difficult for the average person. To help the public understand the quality of the air the Environmental Protection Agency created the Air Quality Index (AQI).

#### **Air Quality Index**

#### How do I know the quality of the air?

Similar to the weather in Kansas, the quality of the air can change from day to day. The AQI is a number and color coded chart or index to help us understand the quality of the air that day and the associated health risks. The AQI works similar to a ruler, and the measuring limits are from 0 – 500. The lower the number assigned that day, the better the quality of the air and the less health risk, while the higher the number assigned, the worse the quality of the air and the greater the health risk. The AQI provides information on 5 major air pollutants; Groundlevel Ozone, Particulate Matter, Sulfur Dioxide, Nitrogen Oxide and Carbon Monoxide. To understand the quality of the air, the AQI is divided into six categories and associated with each category are varying health risks.

Air Quality Index (AQI) Values	Levels of Health Concern	Colors
When the AQI is in this range:	air quality conditions are:	as symbolized by this color:
0 to 50	Good	Green
51 to 100	Moderate	Yellow
101 to 150	Unhealthy for Sensitive Groups	Orange
151 to 200	Unhealthy	Red
201 to 300	Very Unhealthy	Purple
301 to 500	Hazardous	Marcon

"Good" The AQI value for your community is between 0 and 50. Air quality is considered satisfactory, and air pollution poses little or no risk.

"Moderate" The AQI for your community is between 51 and 100. Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people. For example, people who are unusually sensitive to ozone may experience respiratory symptoms.

"Unhealthy for Sensitive Groups" When AQI values are between 101 and 150, members of sensitive groups may experience health effects. This means they are likely to be affected at lower levels than the general public. For example, people with lung disease are at greater risk from exposure to ozone, while people with either lung disease or heart disease are at greater risk from exposure to particle pollution. The general public is not likely to be affected when the AQI is in this range.

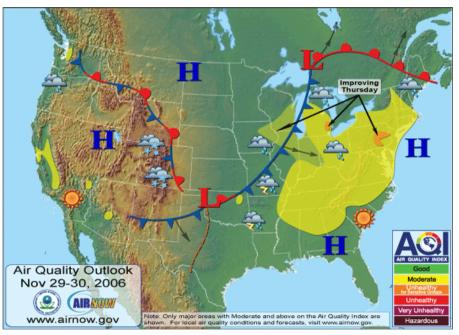
The map (right) represents the air quality outlook for November 29 - 30, 2006. The majority of the United States air quality is 'Good', with a few 'Moderate' and conditions "Unhealthy for Sensitive Groups."

"Unhealthy" Everyone may begin to experience health effects when AQI values are between 151 and 200. Members of sensitive groups may experience more serious health effects.

"Very Unhealthy" AQI values between 201 and 300 trigger a health alert, meaning everyone may experience more serious health effects.

"Hazardous" AQI values over 300 trigger health warnings of emergency conditions. The entire population is more likely to be affected.

To find out the AQI on a day to day basis in Kansas please visit: <a href="www.airnow.gov">www.airnow.gov</a>



# What can I do to improve air quality???

#### ON THE ROAD

- Combine errands into one trip
- Take the bus or carpool to your destination
- Walk or ride your bike
- Keep your personal vehicle well maintained
- Have the emission system checked
- Have your gas cap pressure checked for leaks

#### AT THE GAS STATION

- Avoid spilling fuel to reduce gas fumes
- Stop at the click Don't top off your tank
- Tighten your vehicle gas cap
- Fill up your tank after supper
- In the summer months use plain water to wash your windshield

#### AT HOME

- Plant gardens using native plants and MOW LESS
- Consider an electric or push mower for small yards
- Keep your lawn and garden equipment well maintained
- Mow after supper
- Limit the use of oil-based paints and paint thinners
- Keep all solvents properly stored and tightly capped
- Use a spill-proof gas can for refueling equipment

#### AND DON'T FORGET...

- Maintain the engines of recreational equipment
- Plan activities that don't cause air pollution Hike, bike, skate swim, canoe, sail, golf, play soccer or other team sport you enjoy

Help us all breathe a little easier...

# Program Updates

# The Clean Air Mercury Rule

On March 15, 2005 the Environmental Protection Agency (EPA) issued the Clean Air Mercury Rule in order to reduce mercury emissions from coal-fired power plants. Mercury is found in coal and is emitted from power plants when the coal is burned. Coal-fired power plants are the largest source of mercury emissions in the US. Atmospheric mercury is transported to soil and water through precipitation and can contaminate water bodies such as lakes, rivers and streams. Once in water, the mercury is transformed into methylmercury and can accumulate in fish tissue; humans may then be exposed by eating contaminated fish. The new federal mercury rule, when fully implemented, will reduce power plant mercury emissions by 70%, or from 48 tons a year to 15 tons a year nation wide. To implement the federal rule, the BAR is proposing state regulations which adopt most of the federal rule by reference. For more information about mercury and the EPA's Clean Air Mercury rule visit www.epa.gov/mercury. For more information on the Kansas regulation please visit: www.kdheks.gov/bar/index.html.

# Clean Air Lawn Care Outreach Program

The Clean Air Lawn Care Outreach Program (CALC) is a Kansas Department of Health and Environment initiative for affecting cleaner air for the people of Kansas. We like our lawns to look neat and our gardens to be attractive. Our efforts improve our communities and bring a sense of personal accomplishment. However, the choices we make in caring for our property can also affect our community by contributing to air pollution. Volatile organic compounds (VOCs) and nitrogen oxides (NO<sub>x</sub>) from lawn and garden equipment (mowers, trimmers, gas cans) contribute to ground-level ozone.



The purpose of the program is to reduce air pollution from lawn and garden equipment. CALC is considered to be a "easy going approach" to lawn and garden care. The responsible practices detailed by our printed material are win-win choices that save money and time spent maintaining our yards. Best of all is the benefit of better air in Kansas.

The program will target four audiences; the general public, lawn and garden equipment retailers and manufacturers, the professional lawn care industry, and large landscape customers such as government offices and private entities.

# **Regional Haze Rule**

Regional haze is caused by pollution particles that scatter or absorb light, thereby decreasing the ability to see landscape features. Manmade sources of particle pollution include motor vehicle exhaust, electric utilities, and manufacturing industries.

The Clean Air Act Amendments of 1990 set a national goal to prevent any future, and remedy all existing manmade impairments to visibility in Class I Federal areas. There are 186 Class I areas throughout the country that include national parks, wilderness areas, and wildlife refuges. While there are no Class I areas within the state of Kansas, areas in other states are potentially affected by Kansas emission sources.

The State of Kansas is currently developing a Regional Haze Rule State Implementation Plan (RHR SIP), scheduled to be completed in December 2007. The RHR SIP will establish a long term strategy to address impacts on Class I areas in surrounding states. The amount of emission reductions needed in the state of Kansas will be determined by modeling results and consultations with surrounding states, tribes, and federal land managers (FLMs).

Cameras are used to measure the spectrum of visual conditions as many Class I sites. The photos below show the effects of regional haze at the Great Sand Dunes National Monument in Colorado.



Visual range = 150 miles



Visual range = 340 miles

CENRAP is conducting long-term visibility monitoring throughout the region to develop baseline haze levels, monitor progress, and validate computer models used to predict pollutant levels. Kansas has visibility monitors at Cedar Bluff State Park and Tall Grass Prairie National Preserve. Another visibility monitor is operated by the Sac and Fox Nation in Northeast Kansas. CENRAP is currently completing photochemical modeling runs to determine the amount of emission reductions needed by states and tribes to achieve visibility goals for each Class I area.

Kansas is in the process of working with sources in the state that are eligible for the application of best available retrofit technology (BART). Eligible facilities include those which were placed into operation between 1962 and 1977, and have the potential to emit 250 tons per year of visibility-reducing pollutants. In addition to the BART process, the long term strategy included in the RHR SIP must address the following:

- Emission reductions due to ongoing air pollution control programs
- Measures to mitigate the impacts of construction activities
- Emissions limitations and schedules for compliance to achieve the reasonable progress goal
- Source retirement and replacement schedules
- Smoke management techniques for agriculture and forestry
- Anticipated net effect on visibility due to projected changes in point, area, and mobile source emissions over the period addressed by the long term strategy.

The RHR SIP will be available for public comment in the fall of 2007.



# About the Bureau

# Bureau of Air and Radiation Mission: To protect the public and the environment from radiation and air pollution.

#### **Bureau of Air and Radiation Goals:**

- To conserve air quality
- To control air pollution
- To provide quality service to customers
- To protect the public health and safety from radiation

#### Sections within the Bureau Air and Radiation:

- Air Compliance & Enforcement Section
- Air Operating Permit & Construction Section
- Monitoring & Planning Section
- Radiation, Asbestos & Right to Know Section



#### **Air Compliance and Enforcement Section (ACES)**

The ACES section is responsible for determining compliance, and if needed, issuing enforcement actions due to non-compliance. Air emissions sources in Kansas are subject to state and federal air quality regulations. Depending on the type and quantity of emissions, sources are required to obtain permits and conduct activities such as testing, monitoring, recordkeeping and reporting to demonstrate compliance. The ACES staff uses a combination of inspections, performance test evaluations, report reviews, technical assistance, and enforcement actions to ensure facilities comply with the applicable air quality regulations and permits. Staff from KDHE's district offices, as well as the four cooperating local agencies, conduct inspections and investigate complaints and forward the results to the ACES staff for review and response. The ACES staff oversees performance tests through approval of proposed test plans, on-site observation of performance tests, and review and approval of the reported test results. Periodic reports are reviewed by ACES staff for evaluation of compliance. The ACES staff also provides public outreach and compliance assistance. When a source violates an air quality standard, ACES staff issues formal enforcement actions and work with the source to return them to compliant regulatory status.

#### **Technical Services Unit**

The Technical Services Unit is responsible for permitting refineries, natural gas compressors, foundries and processing facilities. Other activities include PSD modeling and staff members within the unit act as the liaison to the Unified Government of Wyandotte County / Kansas City. KS for permitting activities.

#### **Air Permit Section**

The Bureau of Air and Radiation (BAR) Air Permitting Section (APS) is responsible for reviewing air quality control permit applications and issuing permits for air emissions in accordance with state and federal air quality regulations. Air quality control permits are issued with the goals of conserving air quality, controlling air pollution, and providing quality service to all of our customers.

The APS issues construction permits and approvals prior to construction or modification. The construction permit application allows the APS to determine if or what requirements need to be established for the facility (or emission source) when equipment is constructed or modified. Whether a construction permit or an approval is required depends on the potential-to-emit (PTE) of the proposed construction or modification. The proposed

construction or modification is reviewed to assure that potential emissions from the new or modified equipment will comply with the requirements of state and federal regulations. The construction permit program is also the vehicle by which Kansas implements several other federal programs applicable to new or modified sources that have been delegated to the state to administer. These include the New Source Performance Standards (NSPS), 40 CFR Part 60, and the National Emission Standards for Hazardous Air Pollutants (NESHAP), 40 CFR Part 61 and Part 63. Part 63 is based on maximum achievable control technology, and is usually referred to as the MACT regulations.

BAR also issues operating permits. The potential-toemit of the facility determines the type of operating permit required, if any. The two types of operating permits are Class I (also known as a Title V permit) and Class II (also known as a federally enforceable state operating permit or FESOP). The Kansas Class I operating permit program satisfies the requirements of the federal Title V program and closely parallels the requirements of 40 CFR Part 70. A Class I operating permit is required for major sources of air pollution and provides a complete listing of all air quality regulatory requirements in one document. The Kansas Class II operating permit program provides a method to reduce the potential-to-emit of a source below the major source thresholds and thereby allows the source to operate without a Class I operating permit.

The Department of Air Quality of the Unified Government of Wyandotte County assists in the permitting process by issuing construction and operating permits in Wyandotte County.



#### **Monitoring and Planning Section**

The Air Monitoring and Planning Section administers the air monitoring and modeling program and the emissions inventory program. In cooperation with three local agencies, section staff operates an air monitoring network, which provides air quality data from 25 sites around the state. The monitoring data is analyzed to determine compliance with federal standards and to evaluate air quality trends. Staff members also conduct an annual emissions inventory of pollutants emitted from permitted facilities and other sources for the entire state. Staff members who conduct air quality modeling use the emission inventory data. Modeling allows for a better understanding of the

causes of air pollution and aids in development of pollution reduction strategies in targeted areas. Pollution reduction strategies are incorporated into state and regional plans to protect public health and the environment from the negative effects of air pollution. Other activities include providing outreach on air quality improvement and indoor air quality education.

#### Radiation, Asbestos, Right to Know Section

The Radiation and Asbestos Control Section protects the public and the environment from the harmful effects of manmade radiation, natural radiation and asbestos. This includes administering the radiological emergency response program, the environmental radiation surveillance program, the Kansas Radon Program, the radioactive materials and X-Ray control programs, the asbestos program and the Right-to-Know program. The radiological emergency response program provides planning, training and operational radiological response to all radiation incidents in the State of Kansas. The environmental radiation surveillance program detects, identifies, and measures any radioactive material released to



the environment by the Wolf Creek Generating Station and provides oversight and guidance in the clean-up of other sites contaminated with radioactive materials. The Kansas Radon Program performs outreach and education to the citizens of Kansas on the harmful effects of radon gas and how to test and fix the problem. The radioactive materials and X-Ray control programs regulate the use of ionizing radiation in Kansas. The asbestos program monitors the removal of asbestos from building renovations and demolition projects. This program also issues licenses to asbestos workers to ensure trained personnel conduct appropriate removal activities. Finally, the Right-to-Know program receives information regarding chemical storage and releases and makes such information available to the public.

### Additional Information

United States Environmental Protection Agency Region 7 901 North 5<sup>th</sup> Street Kansas City, Kansas 66101 www.epa.gov/region7

Johnson County Environmental Department Air Quality Program 11811 S. Sunset Drive, Suite 2700 Olathe, KS 66061 www.sharetheair.com

Mid-America Regional Council (MARC) 600 Broadway, 300 Rivergate Center Kansas City, MO 64105 www.marc.org

Shawnee County Health Agency 1615 West 8th Street

Topeka, Kansas 66606

www.co.shawnee.ks.us

 $Unified\ Govt.\ of\ Wy and otte\ County-KC,\ Kansas$ 

Department of Air Quality

619 Ann

Kansas City, Kansas 66101

www.wycokck.org

City of Wichita Environmental Services

1900 East 9th Street

Wichita, Kansas 67214

http://www.wichita.gov/CityOffices/Environmental/AirQuality/

Kansas Dept. of Health and Environment

Division of Environment

Bureau of Air and Radiation

1000 SW Jackson, Suite 310

Topeka, Kansas 66612-1366

www.kdheks.gov/bar/

#### **KDHE-Bureau of Air and Radiation Contacts:**

Administration: Clark Duffy, Director	785-296-6024
Asbestos/Right to Know:	785-296-1689
Compliance:	785-296-1544
Construction Permits:	785-296-1583
Emissions Inventory:	785-296-0451
Modeling:	785-296-6429
Monitoring Data:	785-296-0451
Monitoring:	785-291-3272
Operating Permits:	785-296-1561
Radiation:	785-296-1565

785-296-0910

**Planning** 

Kansas Department of Health & Environment Division of Environment Bureau of Air and Radiation 1000 SW Jackson, Suite 310 Topeka, KS 66612-1366 www.kdheks.gov/bar/



This report was printed on recycled paper.

"DO YOUR PART!"

Paid for by the Kansas Department of Health and Environment